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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/601,301	06/13/2003	Seiji Sarayama	2271/62289-Z	5867

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EXAMINER

HO, TU TU V

ART UNIT	PAPER NUMBER
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2818

DATE MAILED: 02/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/601,301

Applicant(s)

SARAYAMA ET AL.

Examiner

Tu-Tu Ho

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 39-51 and 62-64 is/are pending in the application.
- 4a) Of the above claim(s) 45-51 and 62-64 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 39-44 is/are rejected.
- 7) ☒ Claim(s) 39 and 42 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☒ Certified copies of the priority documents have been received in Application No. 09/590,063.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>06/13/2003</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Oath/Declaration

1. The oath/declaration filed on 06/13/2003 is acceptable.

Election/ Restriction

2. Applicant's election of Invention I, **claims 39-44**, in the reply filed on 12/27/2004 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).
3. **Claims 45-51 and 62-64** are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse as noted above.

Claim Objections

4. **Claim 39 and 42** are objected to because of the following informalities:

Claims 39 and 42 respectively recites: " 10^{-3}cm^{-3} " and " 10^{-2}cm^{-3} ". However, as clearly disclosed in the detailed description, these numbers should be " 10^3cm^{-3} " and " 10^2cm^{-3} ".

Accordingly, " 10^3cm^{-3} " and " 10^2cm^{-3} " are interpreted for examination.

Appropriate correction is required.

Claim Rejections

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. §103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim Rejections § 102 & § 103

5. **Claims 39-40 and 42-44** are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Tischler et al. U.S. Patent 5,679,152 (the '152 patent).

Referring to **claims 39 and 42**, the '152 patent discloses a bulk crystal substrate of GaN, comprising:

a slab of a GaN single crystal (column 1, lines 6-10 and column 4, lines 35-39) having a substantially uniform composition of GaN in a thickness direction of said slab.

However, the reference fails to explicitly disclose a specific number of defect density as claimed. To be specific, instead of disclosing that said slab having a defect density lower than

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about 10^3cm^{-3} or about " 10^2cm^{-3} as claimed, the reference disclose "substantially defect free" (column 4, lines 35-39). It would appear that "substantially defect free" is about equivalent to a defect density lower than about 10^3cm^{-3} or about " 10^2cm^{-3} . Note also that although the reference explicitly fails to disclose "substantially uniform composition", the bulk crystal GaN substrate has substantially uniform composition of GaN because the reference has also failed to disclose otherwise (i.e., non-uniform composition of GaN).

Referring to **claim 40**, the '152 patent further discloses that said slab has a thickness exceeding about $100\mu\text{m}$ (column 7, lines 30-35).

Referring to **claims 43 and 44**, the '152 patent further discloses that said slab is formed of GaN of a hexagonal crystal system or said slab is formed of GaN of a cubic crystal system (paragraph bridging columns 1 and 2).

6. **Claim 39** is rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Tsuda et al. U.S. Patent 6,294,440 (the '440 patent).

The '440 patent discloses a bulk crystal substrate (both "bulk" and "substrate" are interpreted broadly) of GaN, comprising:

a slab (505, Fig. 5, "slab" is interpreted broadly) of a GaN single crystal (column 11, lines 20-25) having a substantially uniform composition of GaN in a thickness direction of said slab.

However, instead of disclosing that said slab having a defect density lower than about 10^3cm^{-3} , the reference discloses a defect density of about 10^3cm^{-2} ($1000/\text{cm}^2$, column 11, lines 25-30). In other words, the reference appears to disclose a defect density in a two-dimensional

space. Nevertheless, the reference does not appear to teach that the defect density would be different in a three-dimensional space. Hence, it appears that the disclosed defect density could equally be applied to the third dimension (10^3cm^{-3}). Note also that although the reference explicitly fails to disclose “substantially uniform composition”, the single-crystal GaN slab has substantially uniform composition of GaN because the reference has also failed to disclose otherwise (i.e., non-uniform composition of GaN).

Claim Rejections - 35 USC § 103

7. **Claim 41** is rejected under 35 U.S.C. §103(a) as being unpatentable over the ‘152 patent for being obvious.

The ‘152 patent discloses a device substantially as claimed and as detailed above including said slab. Although the ‘152 patent fails to disclose that said slab has a thickness exceeding about $300\mu\text{m}$ as claimed, the reference discloses that said slab has a thickness of at least $200\mu\text{m}$ (column 7, lines 30-35). Since the reference fails to teach an upper limit for the slab, it would have been obvious to one of ordinary skill in the art to change the device such that the slab has a thickness exceeding about $300\mu\text{m}$ from the disclosure of “a thickness of at least $200\mu\text{m}$ ”. Furthermore, since both the reference and the present invention have failed to disclose the criticality between the two thicknesses, the change of the thickness from one to the other would have been obvious to one of ordinary skill in the art and therefore would not be patentable.

Conclusion

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8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tu-Tu Ho whose telephone number is (571) 272-1778. The examiner can normally be reached on 6:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, DAVID NELMS can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Tu-Tu Ho
February 04, 2005